The Lung and Nasal Mites of the Genus Pneumonyssus Banks (Acarina: Laelaptidae) with Description of Two New Species from African Primates.

by

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INTRODUCTION.

The object of this paper is to review the present status of the genus *Pneumonyssus* Banks, the members of which are known to inhabit exclusively the respiratory tract of monkeys and baboons *(Cercopithecidae)*, dassies *(Procaviidae)* and dogs *(Canidae)*. Keys are given to the males and females of the known species and two new species from the Vervet Monkey, *Cercopithecus aethiops* (L) and the Chacma Baboon, *Papio ursinus* (Kerr) are described.

One monkey was received from Bedford, Cape Province. A second monkey and baboon were shot by one of the authors in the Alto Limpopo district, Mozambique, during the winter of 1953. The lungs were preserved in 70% alcohol and brought to the South African Institute for Medical Research, Johannesburg, where they were dissolved in a 15% aqueous solution of potassium hydroxide and the deposit examined carefully under a dissecting microscope.

The baboon, an old, very large male, killed near Chicualacuala, was found to be heavily infested with two species of lung mite, both of which proved to be new. One species, which was present in very large numbers, is described here as *P.mossambicensis*. The other, of which only a few specimens were recovered, is identical with mites found in the lungs of *Cercopithecus aethiops* from the same locality and from the forests near Bedford, Cape Province. This species, which is named in honour of Dr. J. A. T. Santos Dias, Tinonganine, Mozambique, is most probably typical for *C.aethiops* and its presence in the baboon only accidental.

THE STATUS OF THE GENUS PNEUMONYSSUS.

The genus *Pneumonyssus* was erected by Banks (1901) to include the first lung mite discovered, *P.simicola* Banks, from the Indonesian "Lampongsche Aap", most probably *Macaca nemestrina* L. This mite was subsequently discovered in the common *Macaca mulatta* Zimmerman (= *Macacus rhesus* Aud.) which has become a most important and widely used laboratory animal. Several authors have therefore had the opportunity of studying its lung mites *P.simicola* has been redescribed several times, by Newstead (1906) as *Pneumonyssus griffithi*, by Landois and Hoepke (1914) as *Pneumotuber macaci*, and by Weidman (1915) as *Pneumonyssus foxi*. Oudemans (1935) and Kirsch (1950) have given good surveys of the literature dealing with the taxonomy and medical importance of *P.simicola.*

In 1932 Vitzthum published a paper on "*Pneumonyssus simicola* Banks" based on specimens found in the lungs of an African baboon, *Theropithecus gelada* (Rüppell). It does not seem likely, however, that the same species of lung mite would occur in an Indonesian and an African host. Fain (1952 a & b) suggested that Vitzthum's species as well as Deschiens' *simicola* from *Papio cynocephalus* (L.) probably belong to *P.congoensis* Ewing (1929), a species described from *Papio doguera* (Pucheran) in the Belgian Congo. According to Furman's (1954) description, however, *P.congoensis* seems to be quite distinct from Vitzthum's species and as we have not been able to obtain the specimens on which Vitzthum based his description, the identity of these mites must remain doubtful.

In 1906 Newstead and Todd described *P. duttoni* from *Cercopithecus nictitans* (L) (= *ascanius* Aud.) in the district of Ituri, Belgian Congo.

The next species to be described was *P.stammeri* Vitzthum (1930) from a South American monkey, *Lagothrix infumatus* (Spix).

A second species of mite harboured by the Oriental *Macaca mulatta* was described by Oudemans in 1935. This mite, *P.dinolti*, was found to live in the maxillary sinus of the monkey.

A most interesting discovery was the presence of a true *Pneumonyssus* species in the lungs of the South African dassie, *Procavia capensis* (Pallas). This species, *Pneumonyssus procavians*, was described by Radford in 1938 and has subsequently been found by us in almost every dassie obtained from the Potschefstroom area, Transvaal.

In 1940 the dog was also found to harbour a *Pneumonyssus* species, *P.caninum.* This mite living in the frontal sinuses and nasal passages, was described by Chandler and Ruhe and was later found in South African dogs by Schulz and Thomas (1953) who have listed all previous records concerning this species.

The two most recently discovered species were described by Fain (1952b) from the Belgian Congo. They are *P.rodhaini* from the Red Colobus, *Colobus badius* (Kerr), and *P.schoutedeni* from a Tree Hyrax, *Dendrohyrax arboreus* (Smith).

Newell (1947), in his review of the family *Halarachnidae* mentions the genus *Pneumonyssus* Banks only very briefly. He says that "the genus *Pneumonyssus* as it now stands will almost certainly require revision, since it apparently includes species of diverse phylogenetic origin."

Like Newell, we believe that most of these species have arisen from *Liponyssus*-like ancestors and that their morphological uniformity is probably due to the similarity of habitat. Whether the *Pneumonyssus* species are really of polyphyletic or monophyletic origin can probably never be ascertained. For practical reasons, therefore, the genus *Pneumonyssus*, which includes a number of endoparasitic mites from the respiratory tracts of land-inhabiting mammals should be retained.

Two other genera at present included in the sub-family *Halarachninae* are *Halarachne* Allman, 1847 and *Orthohalarachne* Newell, 1947 (cf. Zumpt & Patterson, 1951), which are parasitic in the respiratory tract of seals. The genus *Pneumonyssus* can easily be distinguished from these other two genera by the greatly reduced, conical palpi.

The rodent species which Furman described as *P.bakeri* has not been included in this paper. It differs from the other *Pneumonyssus* species in having a genital plate and a sternal plate which is broader than long and should probably be placed in a distinct genus.

KEY TO THE SPECIES OF THE GENUS PNEUMONYSSUS BANKS.

Females.

1 (2) Peritreme more than three times as long as broad.

Dorsal plate in state of reduction with margins irregular and unevenly sclerotised, bearing 4—6 pairs of setae (Fig. 1h); sternal plate absent (Chandler & Ruhe, 1940; fig. 2) or present, but very irregular and variable in shape as in S. African specimens.

Body length 1000—1500μ, greatest width 600—900μ. Dorsal plate 543—578μ long, 228—263μ wide.

Found in frontal sinus and nasal passages of dogs in N. America and S. Africa.

1. **caninum** Chandler & Ruhe, 1940.

2 (1) Peritreme less than 3 times as long as broad 3
3 (6) Dorsal shield with six pairs setae 4
4 (5) Dorsal shield with darker, more strongy chitinised median, longitudinal strip, 4 pairs marginal and 2 pairs discal bristles (Fig. 1a). Palp with 4 free segments.

Body length 1500—1643μ, breadth between coxae III and IV 730μ. Dorsal shield 615μ×275μ. (Oudemans, 1935; figs. 47—48). Male not known. Described from the maxillary sinus of the Indonesian monkey, *Macaca mulatta* Zimmerman (= *Macacus rhesus* Aud.).

3. **dinolti** Oudemans, 1935.

5 (4) Dorsal shield without darker median strip, 3 pairs marginal and 3 pairs discal bristles (Fig. 1j). Palp with 5 free segments.

Length of idiosoma 950—985μ, greatest width 505μ. (Vitzthum, 1930; Figs. 1—2). Male not known. Described from the larynx of the S. American monkey, *Lagothrix infumatus* (Spix).

2. **stammeri** Vitzthum, 1930.

6 (3) Dorsal shield with 5 pairs of setae 7

7 (8) Dorsal shield with marked reticular network (Fig. 1e).

Body length (including capitulum) 726—1013μ, greatest width 274—466μ. Dorsal plate 295μ long, 144μ wide. Sternal plate tapers behind 2nd pair hairs, 128μ long, 64μ wide. Peritreme alveolar in appearance (Fain, 1952; figs. 3 & 7). From lung and nasal passages of the Red Colobus, *Colobus badius* (Kerr), Belgian Congo.

4. **rodhaini** Fain, 1952.

8 (7) Dorsal shield without reticular network 9

9 (12) Dorsal shield with very long setae, 60—65μ.
Parasites of *Procaviidae* 10

10 (11) Sternal plate with setae of about ½ the width of the plate (Radford, 1938; fig. 5).

Dorsal plate relatively broader than in following species, 315—333μ long, 158—166μ broad (Fig. 1g). Peritremes short (25μ), tubular. Sternal plate with lateral margins almost parallel, slightly concave between the hairs, truncate anterior margin, broadly rounded posterior margin 130—140μ long, 75—80μ wide.

Body length, including capitulum, 665—814μ, width between legs III and IV 420—455μ, maximum width 473—534μ. From the lungs of the dassie, *Procavia capensis* (Pallas), in S. Africa.

11. **procavians** Radford, 1938.

11 (10) Sternal plate with setae exceeding width of plate (Fain, 1952; fig.1).

Dorsal plate relatively narrower than in foregoing species (Fig. 1d), 320—335μ long, 134—140μ wide. Sternal plate with sides almost parallel, anterior margin truncate, posterior one broadly rounded, 121—128μ long, 51—54μ wide.

Peritremes oval. Body length, including capitulum, 726—890μ, maximum breadth 480—618μ, breadth between legs III and IV 475μ. From the trachea and bronchus of the tree hyrax, *Dendrohyrax arboreus* (Smith), Belgian Congo.

10. **schoutedeni** Fain, 1952.

12 (9) Dorsal shield with shorter setae (about 40μ). Parasites of *Cercopithecidae* 13

13 (14) Gnathosome, excluding palps, at least 1.5 times as long as broad. (Furman, 1954; fig. 10).

Idiosoma 924μ long, 572μ wide. Dorsal plate egg-shaped, 374$\mu \times$198μ (Fig. 1k). Male not known. From *Papio doguera* (Pucheran), Belgian Congo.

5. **congoensis** Ewing, 1929.

14 (13) Gnathosome approximately as long as broad 15

15 (16) Dorsal shield narrows abruptly between 4th and 5th pairs of hairs, widens very slightly at beginning of posterior third before tapering to a narrow posterior tip (Figs. 1f, 4), length 289—324μ, greatest width 128—140μ.

Sternal plate 108—124μ long, 42—52μ wide. Body length 550—656μ, width between 3rd and 4th pairs of legs 320—390μ. From the lungs of *Papio ursinus* (Kerr), Mozambique.

6. **mossambicensis n.sp.**

16 (15) Dorsal shield tapering smoothly from widest part (end of anterior third) to a broadly rounded posterior tip 17

17 (18) Indonesian species from the lungs of *Macaca nemestrina* (L) and *Macaca mulatta* Zimm. Not separable morphologically from the following species (Fig. 1b, Oudemans, 1935, Fig. 12).

Body length 637μ, breadth between legs III and IV 282μ. Dorsal shield 350—360μ long, 150—158μ wide. Sternal plate 130μ long, 53μ wide.

7. **simicola** Banks, 1901.

(syn: *griffithi* Newstead, 1906;
macaci Landois & Hoepke, 1914;
foxi Weidman, 1915).

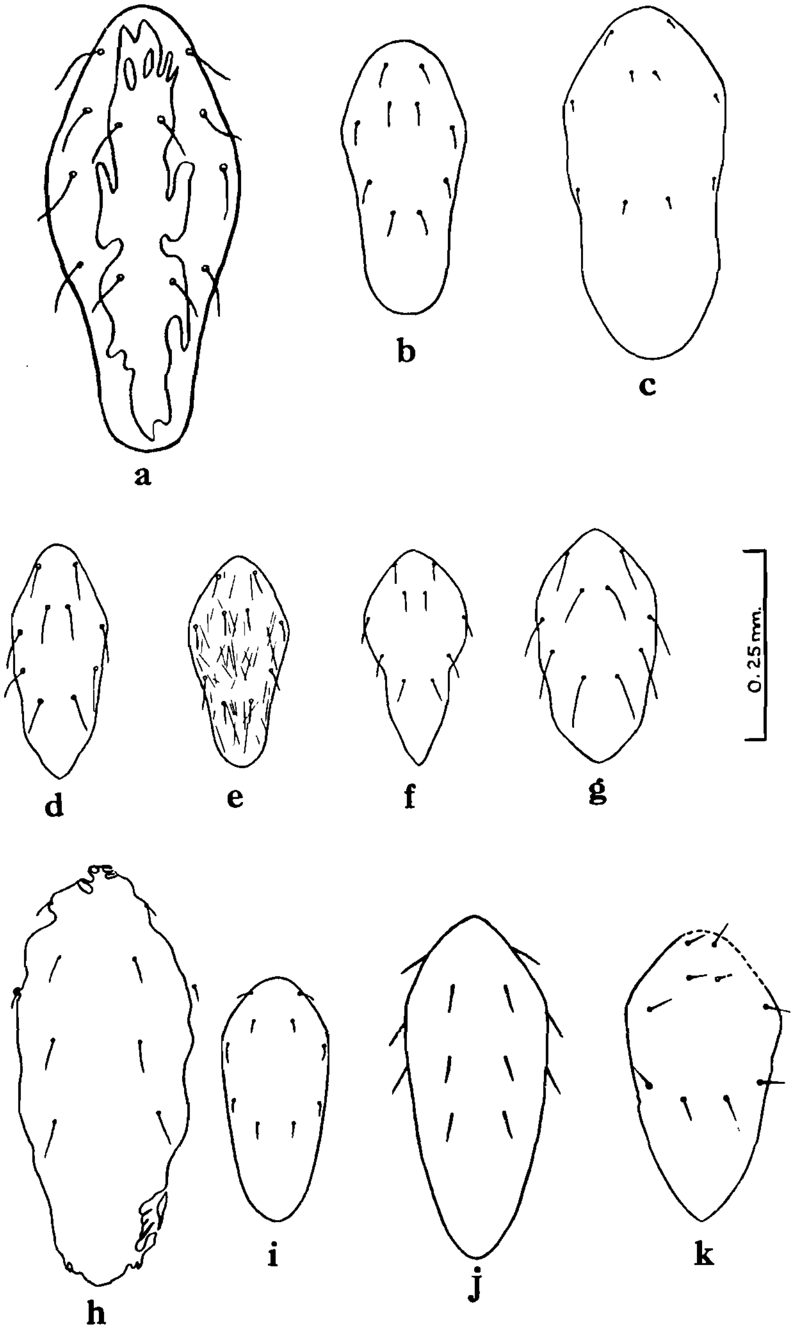
18 (17) African species, morphologically indistinguishable from each other and from fore-going species 19

19 (20) From trachea and bronchus of *Cercopithecus nictitans* (L) (= *ascanius* Aud.), Belgian Congo. (Fig. 1c; Cooreman, 1946; fig. 1).

Body length 660—1658μ, maximum width 300—550μ. Dorsal plate 352—480μ long, 176—240μ wide. Sternal plate 128—160μ long, 76—105μ wide.

8. **duttoni** Newstead & Todd, 1906.

20 (19) From lungs of the Vervet Monkey, *Cercopithecus aethiops* (L), Mozambique and S. Africa, and *Papio ursinus* (Kerr), Mozambique (Fig. 6).


a
b
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Sternal plate 134μ long, 76μ wide at level of 2nd pair of hairs. Body length, including capitulum, 621—700μ, width between legs III and IV 350—394μ, maximum width 411—464μ. Dorsal shield (Fig. 1i) 341—350μ long, 160μ wide.

9. **santos-diasi n.sp.**

Males.

The males of *P.congoensis, dinolti* and *stammeri* are not known.

1 (2) Peritreme more than 3 times as long as broad.

Length of idiosoma 990μ, width 607μ. Dorsal plate leaf-shaped, 616μ×273μ. (Furman, 1954; figs. 1—2).

1. **caninum** Chandler & Ruhe, 1940.

2 (1) Peritreme less than 3 times as long as broad 3

3 (4) Movable digit of chela triangular, terminating in a hook-like filament and bearing a shorter basal prolongation (Fig. 2d). Sternal hairs about 60μ long, their length exceeding the width of the sternal plate between the second pair of hairs (Oudemans, 1935; fig. 37).

Body length, including capitulum, 560—712μ, width 301—340μ.

8. **duttoni** Newstead & Todd, 1906.

4 (3) Movable digit of chela not triangular more or less rectangular, tubular or slender and tapering; length of sternal hairs less than width of plate 5

5 (6) Movable digit more or less rectangular, broad, leaflike with a pointed, terminal hook-like process and a short pointed basal process (Fig. 2a).

Sternal plate with lateral margins almost parallel, 140μ long, 80μ wide. Dorsal shield 333μ long, 166μ wide. Body length, with capitulum, 560—600μ, width between legs III and IV 380—385μ.

11. **procavians** Radford, 1938.

6 (5) Movable digit slender, pointed or tubular; basal process short or filamentous 7

Fig. 1. *Dorsal shields of Females.*

a. P. dinolti Oudemans (after Oudemans).
b. P. simicola Banks (after Oudemans).
c. P. duttoni Newstead & Todd (after Fain).
d. P. schoutedeni Fain (after Fain).
e. P. rodhaini Fain (after Fain).
f. P. mossambicensis n.sp.
g. P. procavians Radford.
h. P. caninum Chandler & Ruhe.
i. P. santos-diasi n.sp.
j. P. stammeri Vitzthum (after Vitzthum).
k. P. congoensis Ewing (after Furman).

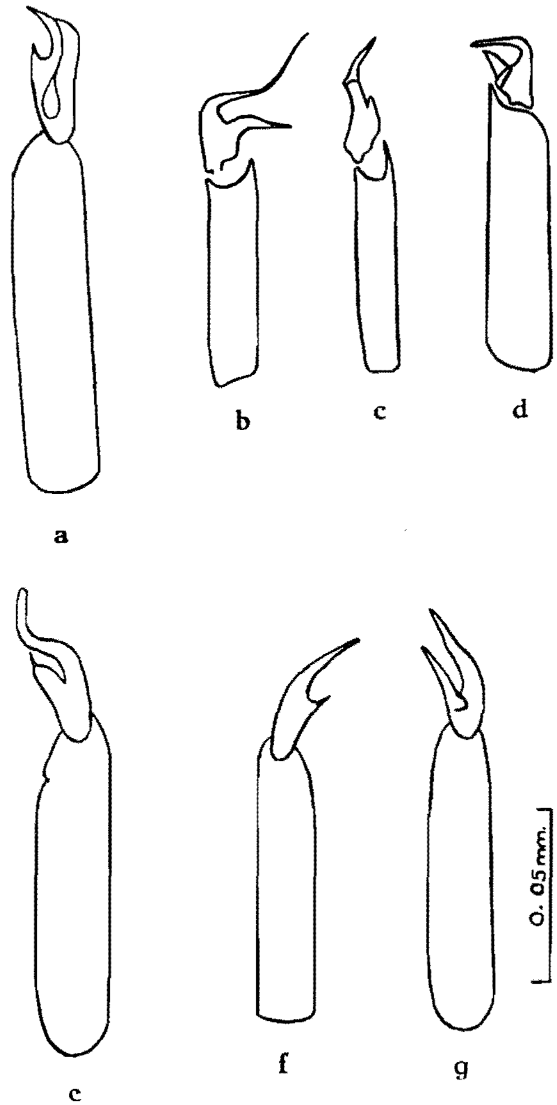

Fig. 2. *Chelicerae of Males.*

a. P. procavians Radford.
b. P. rodhaini Fain (after Fain).
c. P. schoutedeni Fain (after Fain).
d. P. duttoni Newstead & Todd (after Fain).
e. P. santos-diasi n.sp.
f. P. mossambicensis n.sp.
g. P. simicola Banks.

7 (8) Movable digit terminating in a long tubular process with 2 right-angled bends, basal process blunt, thumb-like, bearing two delicate, pointed spinelike processes (Fig. 2e).*)

Sternal plate 123μ long, 70μ wide. Dorsal plate 306—341μ long, 149—158μ wide. Body length, including capitulum, 464—490μ, width between legs III and IV 280—290μ (cf. fig. 5).

9. **santos-diasi n.sp.**

8 (7) Movable digit curved or S-shaped, pointed, no right-angled bends, basal process angular or pointed 9

9 (12) Basal process relatively long, at least ½ length of terminal filament 10

10 (11) Dorsal shield with pronounced reticular network, 304μ long, 160μ wide. Movable digit of chela terminating in a slender, long 30μ filament and bearing a 15μ long, pointed basal prolongation (Fig. 2b).

Body length, including capitulum, 616—685μ, width 274—276μ, sternal plate 122μ×64μ (Fain, 1952; fig. 4).

4. **rodhaini** Fain, 1952.

11 (10) Dorsal shield without reticular pattern, 350—365μ long, 140—155μ wide. Movable digit of chela terminates in a pointed process, about 20μ long, and bears a slightly shorter (14μ) pointed basal prolongation (Fig. 2g).

Body length 500—560μ, width 245—290μ, sternal plate 123μ×53μ (Oudemans, 1935; figs. 19—20).

7. **simicola** Banks, 1901.

12 (9) Basal process relatively short, about 1/3 as long as terminal filament 13

13 (14) Movable digit S-shaped with transverse crest on convex surface, basal process short, broad, angular. Parasite of *Dendrohyrax* (Fig. 2c).

Larger than following species. Body length 575—580μ, width 315—350μ. Dorsal shield 320—325μ long, 144—148μ wide. Sternal plate 122—128μ long, 51—56μ wide (Fain, 1952; fig. 2).

10. **schoutedeni** Fain, 1952.

14 (13) Movable digit curved, not S-shaped, outer border smoothly convex, basal process finely pointed. Parasite of baboons (Fig. 2f).

Smaller than foregoing species. Body length 430μ, width between legs III and IV 228—263μ. Dorsal shield 298μ long, 140—149μ wide. Sternal plate 110—114μ long, 50—52μ wide between 2nd pair of hairs (Fig. 3).

6. **mossambicensis n.sp.**

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*) Only one indicated in drawing.

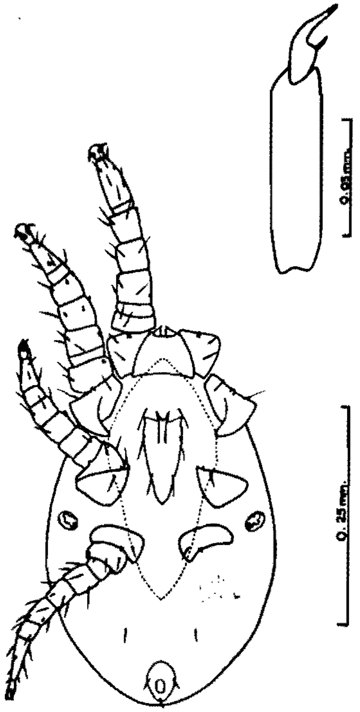

Fig. 3. *Pneumonyssus mossambicensis n.sp.*
Ventral surface and chela of male (dorsal shield dotted).

NOTES AND DESCRIPTIONS OF SPECIES.

1. **Pneumonyssus caninum** Chandler & Ruhe, 1940.

The original description of *P.caninum* was based on female and larval forms found in the frontal sinuses and nasal passages of a male Bulldog. Since then its occurence has been reported several times from North America and in 1953 Schulz and Thomas found this species in dogs in South Africa. The male of *P. caninum* was first recorded by Furman (1954) and according to the description given, it appears to resemble the female in having a long, tubular peritreme and a leaf-shaped, finely porose dorsal plate. We have seen only the female of this species, several specimens of which were very kindly sent to us by Dr. O. G. H. Fiedler of the Veterinary Research Laboratories, Onderstepoort. In these specimens the peritreme is at least seven times as long as broad.

2. **Pneumonyssus stammeri** Vitzthum, 1930.

This species has not been recorded since it was first described by Vitzthum from the South American Monkey, *Lagothrix infumatus* (Spix). Deschiens described this species in 1951, but apparently no new material was received. We have not yet seen this species, but it should be easily recognisable by the presence of six pairs of setae on the dorsal shield, the palpi with 5 free segments and the short peritreme.

3. **Pneumonyssus dinolti** Oudemans, 1935.

This species was based on 2 females found in the maxillary sinus of the Indonesian monkey, *Macaca mulatta* Zimm. Deschiens (1951) gave a description of this species based on Oudemans' original account. Dr. C. O. van Regteren Altena, Rijksmuseum, Leiden, very kindly lent us a specimen of *P.dinolti* so that we are able to confirm Oudemans' description.

4. **Pneumonyssus rodhaini** Fain, 1952.

Fain described this species from a large number of males, females and larvae recovered from the nasal passages, lung parenchyma and bronchioles of the Red Colobus, *Colobus badius* (Kerr). We have not seen this species, the characters used in our key having been taken from Fain's description.

5. **Pneumonyssus congoensis** Ewing, 1929.

P.congoensis was based on 4 females taken from a dog-faced baboon, *Papio sp.*, Lulenga, Belgian Congo. Bequaert (1930) states further that these mites were found in the windpipe of a young baboon, *Papio tessellatus* Elliott (=*P.doguera tessellatus*). Furman (1954) re-described this mite. We have not been able to see this species, but according to the characters given by Furman and used in our key, it should be easily distinguishable from other *Pneumonyssus* species.

6. **Pneumonyssus mossambicensis n.sp.**

This species closely resembles *P.simicola* Banks, from which it can be distinguished by the shape of the dorsal shield and by the structure of the male chelicera.

Male. (Fig. 3) — Body length, including mouthparts, 430μ in holotype, 420μ in two paratypes; width between 3rd and 4th pairs of legs 228μ in holotype, 254 and 260μ in the two paratypes. The dorsal shield has a median length of 290μ (280μ in paratypes) and a greatest width of 130μ, and bears 5 pairs of hairs. The uncovered part of the dorsum bears 3 pairs of hairs. The sternal plate has a median length of 116μ (100 and 110μ in the paratypes) and a width at the level of the 2nd pair of hairs, of 46μ (46 and 48μ in the paratypes). The anterior part of the sternal plate is weakly sclerotised, the 1st pair of hairs appearing therefore to be situated on soft skin. The sternal hairs are about 25μ in length. The anal plate is egg-shaped, about 60μ long, 40μ wide, and bears 3 hairs. The short, alveolar peritremes are situated ventro-laterally between the 3rd and 4th pairs of legs and are surrounded by oval plates. One pair of delicate hairs can be distinguished on the venter.

The palps are small, the number of segments being indistinguishable in these specimens. The large chelicerae are 82μ long (78—82μ in paratypes), excluding the spermatophore, which bears a slender sharply pointed basal process. All the legs terminate in a pulvillus and a pair of claws which are less well developed on the 4th pair than on the other legs. Those on the 1st pair of legs are about 20μ long. The leg measurements of the holotype are given in the following table (in μ):

Number of leg	Total length	Tarsus	Tibia	Genu	Femur	Trochanter	Coxa
I	224	60	30	30	40	20	44
II	192	50	22	26	34	28	32
III	190	50	24	26	34	26	30
IV	220	70	30	32	40	24	24

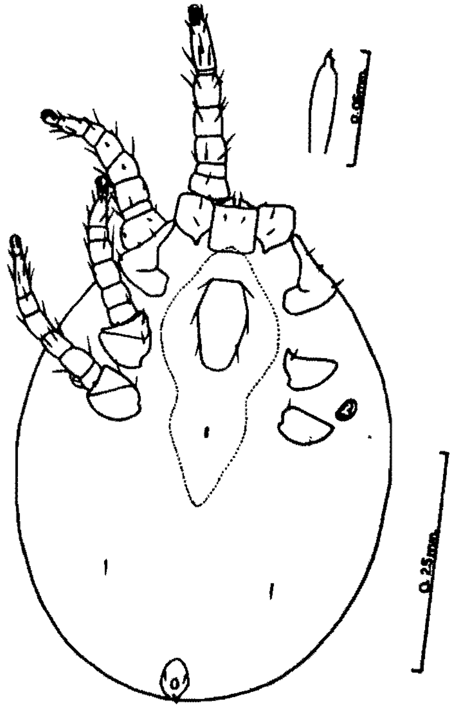

Fig. 4. *Pneumonyssus mossambicensis n.sp.*
Ventral surface and chela of female (dorsal shield dotted).

Female (Fig. 4) — Body length (including mouth-parts) of 10 specimens 550—656μ (average 620μ). Width between 3rd and 4th pairs of legs 320—390μ (average 358μ). The dorsal plate has the shape shown in the diagram and has a median length of 298—324μ (average 308μ) and a greatest width of 128—140μ (average 135μ). It bears 5 pairs of fine hairs about 20μ long. The sternal plate has a truncate anterior margin, although this is indistinct in some specimens, and a broadly rounded posterior tip. It bears 3 pairs of hairs, approximately 20μ long, and has a median length of 108—124μ (average 117μ), and a width, at the level of the 2nd pair of hairs, of 42—52μ (average 48μ). The anal plate is broadly oval in shape with a median length of 55μ and greatest width of 42μ.

The peritremes are shaped as in the male, and there are 3 pairs of dorsal and 1 pair of ventral setae on the soft skin of the body. The gnathosome is almost rectangular with an average median length of 48μ, excluding palpi, and width of 46μ. The chelicerae are small, terminating in one pointed and one shorter, blunt digit. The palps are very small, the number of segments being indistinguishable. Each leg terminates in a pair of claws and a pulvillus. The claws of leg I are 20μ long, and those of leg IV are weakly developed. The leg mesurements (in μ) of one female are given in the following table:

Number of leg	Total length	Tarsus	Tibia	Genu	Femur	Trochanter	Coxa
I	230	64	30	30	40	20	46
II	190	50	26	26	34	30	24
III	180	50	24	26	36	24	20
IV	216	68	30	28	40	30	20

The species is based on 3 males and 47 females from the lung of the Chacma Baboon, *Papio ursinus* (Kerr), Chicualacuala, Mozambique, 12.VII.53.

7. **Pneumonyssus simicola** Banks, 1901.

We have recovered male, female and larval forms of this species from *Macaca mulatta* lungs which were sent to us by Dr. G. L. van Eyndhoven, Zoölogisch Museum, Amsterdam. Although the females of this species are morphologically indistinguishable from those of *P.duttoni* Newstead & Todd and *P.santos-diasi n. sp.*, the structure of the male chelicerae in all three species is quite distinct.

8. **Pneumonyssus duttoni** Newstead & Todd, 1906.

Oudemans (1935) gave a detailed description, with drawings, of the male and larval forms of this species and Cooreman (1946) contributed a description of the female. These accounts were recently supplemented by Fain (1952) in a paper on the genus *Pneumonyssus* in the Belgian Congo.

We have not been able to obtain any specimens of *P.duttoni* but the males should be easily distinguishable by the structure of their chelicerae. We have not been able to find any characters in the above-mentioned descriptions which could be used to separate the females from those of *P.simicola* and *P.santos-diasi.*

9. Pneumonyssus santos-diasi n.sp.

This species is easily distinguishable from other known Pneumonyssus species by the structure of the male chelicera, the movable digit of which is long and tubular and bent to form two right angles.

Male. (Fig. 5) — Body length (including mouthparts) 490μ in holotype, 464 and 473μ in the two paratypes, body width between 3rd and 4th pairs of legs 290μ in holotype, 280—290μ in paratypes. The dorsal shield has a median length of 324μ (306—341μ in paratypes), greatest width of 158μ (149 & 158μ in paratypes) and bears five pairs of hairs. The remaining uncovered part of the dorsum bears three pairs of hairs, the first pair close to the lateral margin between the 3rd and 4th pairs of legs, the 2nd close to the postero-lateral border of the dorsal shield and the third pair approximately mid-way between the second and the posterior margin of the body. The sternal plate, which bears three pairs of slender hairs, has a median length of 123μ and a width of 70μ at the level of the 2nd pair of hairs. Anteriorly

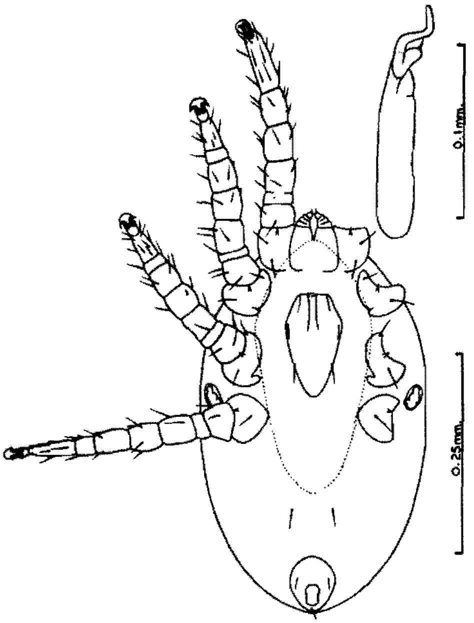

Fig. 5. *Pneumonyssus santos-diasi n.sp.*
Ventral surface and chela of male (dorsal shield dotted).

its borders are indistinct, posteriorly it tapers to a rounded point. The anal plate is terminal in the holotype and one paratype. In the second paratype the entire plate is visible ventrally, and in this specimen it has a length of 61μ and breadth of 53μ. It bears three fine hairs. The short peritremes are situated ventro-laterally between the 3rd and 4th pairs of legs and have an alveolar appearance. Each is surrounded by a weakly sclerotised, oval peritremal plate. One pair of delicate hairs can be distinguished on the venter. The palps are small and conical with 4 free segments. The chelicerae are large, about 100μ long excluding the terminal digit. This is a long tubular structure with two right-angled bends, and bearing a thumb-like basal process, the tip of which is produced into two sharply pointed spines. The leg measurements of the holotype (in μ) are given in the following table:

Number of leg	Total length	Tarsus	Tibia	Genu	Femur	Trochanter	Coxa
I	316	74	42	42	60	36	52
II	250	54	36	40	50	40	30
III	244	54	34	40	50	38	28
IV	312	88	44	40	60	40	40

Female (Fig. 6) — Body length (including mouthparts) 621—700μ (average 656μ); width between 3rd and 4th pairs of legs, 350—394μ (average 373μ), maximum width 411—464μ. Dorsal shield shaped as in the male with a median length of 341—350μ and greatest width of 160μ. The sternal plate which bears 3 pairs of hairs, is truncate anteriorly and tapers posteriorly to a rounded tip. Its average median length is 134μ and its greatest width at the level of the 2nd pair of hairs is 76μ.

The anal plate is terminal in position, with a width of 58μ. Its length is difficult to ascertain. The genital orifice is a transverse slit extending between the 4th pair of legs. Hairs of the dorsal and ventral surfaces, and peritremes as in the male. Palps as in the male.

Chelicerae small, terminating in two digits, a pointed ventral one and a shorter, blunt dorsal one.

The leg measurements of one female specimen are given in the following table (in μ):

Number of leg	Total length	Tarsus	Tibia	Genus	Femur	Trochanter	Coxa
I	336	80	44	50	66	36	60
II	266	60	40	40	56	40	30
III	256	58	34	40	50	44	30
IV	302	88	44	40	60	40	30

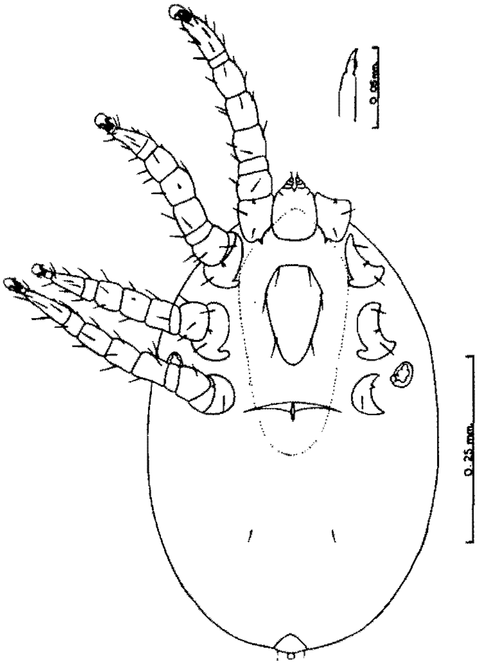

Fig. 6. *Pneumonyssus santos-diasi n.sp.*
Ventral surface and chela of female (dorsal shield dotted).

Larva: The two larvae measure respectively 455μ × 263μ and 490μ × 298μ. No characters could be found which would separate the larvae of this species from those of *P.simicola* Banks and *P.duttoni* Newstead & Todd.

The species is based on 3♂♂, 3♀♀ and 2 larvae from the monkey *Cercopithecus aethiops* L., Bedford, Cape Province. The monkey was to sent us by Dr. P. A. D. Winter of the South African Polio Research Foundation. Other material includes 1♂ 1♀ from the same host, Chicualacuala, Mozambique, and 1♂, 6♀♀ from *Papio ursinus* (Kerr), Chicualacuala, Mozambique.

10. **Pneumonyssus schoutedeni** Fain, 1952.

We have not seen this species which Fain described from the tree hyrax, *Dendrohyrax arboreus* (Smith) in the Belgian Congo. The separating features used in our key have been taken from Fain's description and drawings, according to which *P.schoutedeni* appears to be quite distinct from other members of the genus *Pneumonyssus*.

11. **Pneumonyssus procavians** Radford, 1938.

Radford described male, female and larval forms of this mite from the lungs of the dassie, *Procavia capensis* (Pallas), and his description was supplemented by Furman in 1954. We have found these mites in the lungs of almost every dassie obtained from the Potschefstroom district, Transvaal.

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The holotypes and several paratypes are in the collection of the South African Institute for Medical Research, Johannesburg. Paratypes of *P.mossambicensis* have been presented to the British Museum, London, the Natal Museum, Pietermaritzburg, the Rijksmuseum van Natuurlijke Historie, Leiden, the University of California, U.S.A., the Zoölogisch Museum, Amsterdam, and the Veterinary Research Laboratories, Onderstepoort.

REFERENCES:

BEQUAERT, J. (1930). Medical and Economic entomology. In "The African Republic of Liberia and the Belgian Congo", **2**, 797.

CHANDLER, W. L. and RUHE, D. S. (1940). *Pneumonyssus caninum n.sp.*, a mite from the frontal sinus of the dog. J. Parasitol., **26**, 59.

COOREMAN, J. (1946). Observations sur *Pneumonyssus duttoni* Newstead et Todd. Acarien parasite de la trachée de *Cercopithecus ascanius* Audebert, au Congo Belge. Rev. Zool. Bot. Afr., **39**, 331.

DESCHIENS, R. (1951). L'acariase de l'appareil respiratoire chez les primates et chez l'homme. Ann. Inst. Pasteur, **80**, 107.

EWING, H. E. (1929). Notes on the lung mites of primates (Acarina, Dermanyssidae), including the description of a new species. Proc. ent. Soc. Wash., **31**, 126.

FAIN, A. (1952a). L'acariase pulmonaire au Congo Belge Ann. Soc. Med. Trop. Belge, **32**, 41.

FAIN, A. (1952b). Sur les Acariens parasites du genre *Pneumonyssus* au Congo Belge. Description de deux espèces nouvelles chez le Daman et le Colobe. Rev. Zool. Bot. Afr., **45**, 358.

FURMAN, D. P. (1954). A revision of the genus *Pneumonyssus* (Acarina: Halarachnidae). J. Parasitol., **40**, 31.

KIRSCH, E. (1950). Pathologische Lungenveränderungen beim Rhesusaffen, hervorgerufen durch *Pneumonyssus simicola* (Acarina). Z. f. Parasitenkunde, **14**, 626.

NEWELL, I. M. (1947). Studies on the morphology and systematics of the family Halarachnidae Oudemans 1906 (Acari, Parasitoidea). Bull. Bingham Oceanogr. Coll., **10**, 235.

OUDEMANS, A. C. (1935). Kritische Literaturübersicht zur Gattung Pneumonyssus. Beschreibung dreier Arten, darunter einer Neuen. Z. f. Parasitenkunde **7**, 466.

RADFORD, C. D. 1938). *Pneumonyssus procavians n.sp.*, a new lung mite. Ann. Transvaal Museum, **19**, 147.

SCHULZ, K. C. A. and THOMAS, A. D. (1953). *Pneumonyssus caninum*, the frontal sinus and nasal mite of dogs. J.S.A. Vet. Med. Ass., **24**, 107.

VITZTHUM, H. G. (1930). *Pneumonyssus stammeri*, ein neuer Lungenparasit. Z. f. Parasitenkunde, **2**, 595.

VITZTHUM, H. G. (1932). *Pneumonyssus simicola* Banks. Z. f. Parasitenkunde, **4**, 48.

ZUMPT, F. and PATTERSON, P. M. (1951). Further notes on Laelaptid mites parasitic on Vertebrates. A preliminary study to the Ethiopian fauna. J. ent. Soc. S. Afr., **14**, 63.